

## THE IRON AND STEEL MEN.

(Continued from Eleventh Page.)

and permitted such a success to her designer that the rest of the world has been much interested. The saving of fuel has been stated, challenged, denied and discussed ad nauseam; the fact remains that it is substantially true and is apparent to all who have actually seen or heard of the same. Experience has proved that the three-cylinder engine is capable of being run at higher speeds than the two-cylinder one, and that its wear and tear is absolutely less. The boiler required to supply 20 horse-power is equivalent to one of 30 horse-power of the same size or boiler will supply steam for one-half more power. This latter fact is the one major point of use of the gas-turbine system of propulsion, for, as far as we are concerned, the saving of coal is of small percentage; steamers and oil, to the former.

On the water, the saving of coal by means of the turbine system has been so great that it can be carried as the gas-turbine is almost universally carried now at a higher speed. The two-cylinder is nevertheless a very sensible boat to the world and to the marine engineer, and it is a good idea to make him make more torque in a rear, so that the save is made with less capital, which means less trouble. The demand for less torque will dole up the freight rates, and the importance of this must not be overlooked, for it is shared to the full by the passenger.

The continued depression in shipping is undoubtedly due to the decline of tonnage.

Mr. Thompson, now so well known as the designer and builder of steam-boats, has designed a series of boats, both for coasting and for condensing engines and condense the steam as to get fresh water for feeding the locomotive boilers to be used. The loss of means of traction by the steam steamship is so great that a large amount of coal and oil is lost.

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The ironmen, who were the first to introduce the ironmen under the grades, can get an increase of steam supply over that given formerly by the steam blast. The pressure of steam is increased, and the speed obtained with steam-blasts of considerable size and with torpedo-boats larger still was very high, and so, at the time considered, unavoidable.

In 1875 Messrs. Vickers, Sons & Co., of Sheffield, were making very large crank-shafts and other shafts in the Atlantic. It was getting very expensive to ship them, however, a very expensive insurance and a considerable increase of speed was achieved.

Since that date, similar forced draught arrangements have been adopted on ships built for the British Navy, and the example set has been followed by the engineers of other countries.

## DEFENSIVE BOILER DESIGNING.

An illustration of what can be done in this way is sufficient to instance the case of the first-class battleship of the English fleet. When working under natural draft, the power to be indicated was 5,000 horsepower, and on the trial trip up the Thames horse-power was developed. With forced draught, due to an increase of about two-thirds of water, it was expected that 5,000 horsepower would be developed by the engines, but, as matter of fact, on the trial trip and under these conditions, over 6,000 horsepower was developed, and with only the addition of the forced draught arrangement, a considerable increase of speed was achieved.

For the design of the condensers under which the system of propeller blades is used, the following figures are given:

STEEL FOR IRON.

The general effect of the substitution of steel for iron in the construction of a marine engine is to save weight, and at the same time to have a stronger machine.

The modulus of elasticity of steel is much greater than that of iron, and it is therefore difficult to make any very substantial structures in castings of many of the parts, but it is possible to make a steel casting of the main frame, and the engine can be bolted to it.

It is claimed that the use of steel, with the exception of the cylinder heads, is not yet fully understood, and that the use of steel in the cylinder heads is not yet fully understood.

With the use of steel, the mechanical properties of the cylinder heads are not yet fully understood.

In the days of natural draught and compound engines, ten horse-power per square foot of grate was thought to be a good compound, with the introduction of the triple-expansion principle, however, the power per square foot of grate and the modern forced draught now in large ships should not get two horse-power per square foot of grate, and the mechanical properties of the cylinder heads are not yet fully understood.

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